

## ANNUAL REPORT

1961

TOWN OF FERGUS

TD227  
F47  
W38  
1961  
MOE

c.1  
a aa

### Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at [copyright@ontario.ca](mailto:copyright@ontario.ca)

ANNUAL REPORT

ON

TOWN OF FERGUS

SEWAGE TREATMENT PLANT

OWRC PROJECT - 58-S-23

TD  
227  
F47  
W38  
1961  
MOE  
astn



*Environment Ontario*  
Laboratory Library  
125 Resources Rd.  
Etobicoke, Ontario M9P 3V6  
Canada

FERGUS SEWAGE TREATMENT PLANT

OPERATED FOR

THE TOWN OF FERGUS

BY

THE ONTARIO WATER RESOURCES COMMISSION

Mr. A. M. Snider	- Chairman
Dr. A. E. Berry	- General Manager
Mr. D. S. Caverly	- Assistant General Manager, and Director of Plant Operations
Mr. B. C. Palmer	- Assistant Director, Division of Plant Operations
Mr. A. C. Beattie	- Project Engineer, Division of Plant Operations

Prepared by the  
Division of Plant Operations

## PROJECT DEVELOPMENT

The Town of Fergus approached the Ontario Water Resources Commission in April of 1958 to undertake the financing and operation of a new sewage treatment plant.

The plant was designed by Proctor & Redfern of Toronto, and Canadian Engineering & Contracting Company, Ltd. of Hamilton began construction in July of 1959.

In July, 1960, two plant operators were hired and the plant was put into operation under the supervision of the Division of Plant Operations.

1961 was the first full year of operation of the plant. The two highlights of the year were the official opening of the plant and the acquisition of the plant site from the Gows.

The plant was officially opened on October 19, 1961 by Harry Worton, M.P.P. for Wellington South, assisted by Mayor W. K. Denny of Fergus, and Mayor Robert Simpson of Arnprior, a member of the Ontario Water Resources Commission. A large number of students attended the official opening and were given guided tours of the treatment plant by OWRC staff. "Open House" to residents of Fergus was held on Sunday, October 29, 1961 and, in spite of poor weather, 75 local citizens toured the plant.

The costs of acquiring the plant site amounted to \$15,033.89. The scrap machinery which was formerly located near the treatment units has been moved to the far west end of the plant site. A number of scrap dealers will be contacted in 1962 in an attempt to receive some money for the material.

A considerable amount of landscaping was done during the summer of 1961 and further landscaping is planned for 1962. Most of the landscaping was done by the plant operators but bulldozers and the necessary fill were obtained from local contractors.

The treatment process has been generally good and is gradually improving as the operators obtain more experience. A further improvement in final effluent can be expected during 1962.

Difficulties in the treatment process can be summarized as follows:

1. The extremely low flows during most of the year (9 months) prevents the plant from operating at its maximum efficiency. The amount of aeration given to the activated sludge is more than required, but it cannot be reduced because the mechanism is already at its minimum speed. As a result, the suspended solids in the final effluent are higher than normal.

The low flow also makes it necessary to return more activated sludge than required because the pump is already at its minimum capacity.

2. During March, April and May, the flows reaching the plant reach peaks of two times the design capacity and the average daily flows during these months are more than three times the average for the other 9 months. These extreme flows are probably due to the

number of roof leaders connected to the sewers. This problem is not too serious at present, but all new houses should be prohibited from such connections and the built up sections should be instituted.

3. The sludge digestion tank has been giving some minor difficulties. It has been found that the contents of the tank do not readily settle with the result that the sludge is rather watery and the supernatant not very clear. The small size of the digester is believed responsible for this condition. Some improvements have been made during the past year and with further study the performance should improve.
4. The plant has been relatively free of mechanical difficulties during the past year with the exception of the barminutor. The cutting teeth and screens have become worn and will be replaced in 1962.

#### OPERATORS

The plant is operated 8 hours per day from Monday through Friday and is checked over for 2 hours on Saturdays and Sundays. The chief operator is Mr. Roy Bridge and Mr. Arthur Carlaw is an operator.

In order to bring some degree of uniformity to the hours of work of OWRC employees, it is proposed that the hours of work be reduced from the present 44 per week to 40 hours per week.



## DESCRIPTION OF PLANT

### General Description

The Fergus Sewage Treatment Plant is an activated sludge type using mechanical aeration. The 12 hour design flow is 600,000 gallons per day, which will treat the sewage from 4700 persons at a flow of 128 gallons per capita per day.

### Inlet Sewer

There is an 18" diameter sewer which runs through an overflow chamber beside the two existing septic tanks. Excess flow in the inlet sewer overflows a weir and runs into the two septic tanks.

### Septic Tanks

The two existing tanks are 36' x 22' x 10' deep and are used to provide partial treatment to the storm flow. The effluent from these tanks is discharged to the chlorine contact chamber and then to the river.

### Coarse Bar Screen

A coarse bar screen is located in the overflow. This unit has 1" x  $\frac{1}{4}$ " bars at 4" centers to screen out large objects from the sewage.

### Barminutor

The sewage which enters the plant passes through an 18" barminutor which cuts and shreds the solid material.

### Grit Removal

Inorganic material such as sand, grit, etc. is mechanically removed from the sewage by a Dorr-Oliver Type T detritor. This

unit has a manually cleaned bypass channel in case the mechanism breaks down.

#### Flow Measurement

After grit removal, the raw sewage passes through a 6" Parshall flume, which records the rate of flow and total flow for each day.

#### Primary Sedimentation Tank

The primary sedimentation tank is 40' square with a 9' side wall depth equipped with a Dorr-Oliver rotary scraper mechanism. The volume of the tank is 14,400 cubic feet which gives a detention time for 3.6 hours.

The function of this tank is to separate the solids from the incoming sewage by allowing them to settle to the bottom of the tank while the settled sewage flows over the effluent weirs.

The primary tank is oversized to accommodate the peak flows which occur in the spring. A bypass channel is provided around the primary tank. The outlet chamber from this tank is provided with an overflow weir to divert the flow in excess of 0.9 MGD to the effluent sewer.

#### Aeration Tank

The aeration tank consists of 3 units, each 24' square x 10'-8" SWD with a total volume of 22,080 cubic feet, which provides a detention period of 4.41 hours at a flow rate of 0.6 MGD. Each unit is provided with a high intensity mechanical aeration cell using the British Simplex Aeration Process.

### Final Sedimentation Tank

The final sedimentation tank is 35' square with a 9' side wall depth equipped with a Dorr-Oliver rotary scraper mechanism. The volume of the tank is 11,025 cubic feet, which gives a detention time of 2.2 hours at a flow rate of 0.6 MGD with 25% return sludge.

### Pump Building

The main building at the plant houses the combined office and laboratory, the chlorination room, a washroom and a pump room.

The following pumps are located in the pump room:

- (a) One 150 GPM Fairbanks-Morse centrifugal raw sludge pump equipped with a 5 H.P. electric motor. This unit pumps raw sludge which is settled out in the primary sedimentation tank over to the digester.
- (b) One 350 GPM Fairbanks-Morse centrifugal return sludge pump equipped with a variable speed drive and an electric motor. This pump is used to return the activated sludge from the bottom of the final sedimentation tank to the aeration tank.
- (c) One 350 GPM Fairbanks-Morse centrifugal return sludge pump equipped with a variable speed drive and an electric motor. This is a standby unit.

### Digester

The heated digester is 35' diameter x 22' SWD having a volume of 22,700 cubic feet. This volume allows for a capacity

of 4.8 cubic feet per capita. The digester is equipped with a Dorr-Oliver floating cover and a draft tube mixer. The sludge in the digester is heated by a Pacific Flush tank heat exchanger which is located in the digester building.

The sludge in the digester is heated to a temperature of 90° F., and it is broken down by bacterial action into (1) thick, black, odourless digested sludge (2) a relatively clear supernatant liquor which is returned to the aeration tank and (3) digester gas which is used in the heat exchanger to heat the digester. Standby fuel is oil. The digested sludge is run out on sand beds for drying and later disposal as a soil conditioner.

#### Sludge Drying Beds

There are four sand sludge drying beds each 80 feet long x 22½ feet wide, having a total area of 7,200 square feet.

#### Chlorination

A 200 lb/24 hour capacity Builders Providence gas chlorinator is located in the end of the main building.

Chlorine is injected into the outlet chamber of the final sedimentation tank. The chlorinated effluent flows to a chlorine contact chamber located near the outlet of the existing septic tanks.

The volume of the chlorine contact chamber is 911 cubic feet, which gives a contact period of 13.7 minutes.

The final effluent is discharged to the Grand River through a 30" outfall sewer.

FLOW RECORDS M.G.D.

MONTH	ABSOLUTE MAXIMUM	AVERAGE MAXIMUM	AVERAGE DAILY FLOW	TOTAL MONTHLY FLOW	AVERAGE DAILY WEEKDAY FLOW	AVERAGE DAILY WEEKEND FLOW
JAN.	0.40	0.28	0.24	8.7 *	0.25	0.21
FEB.	0.75	0.33	0.25	6.7	0.46	0.30
MARCH	0.72	0.42	0.32	9.9	0.33	0.28
APRIL	1.35	0.62	0.52	15.7	0.55	0.47
MAY	1.20	0.76	0.61	19.0	0.61	0.62
JUNE	1.80	0.62	0.37	11.2	0.34	0.47
JULY	1.57	0.66	0.33	10.3	0.32	0.36
AUGUST	1.86	0.56	0.25	7.7	0.24	0.27
SEPT.	Flow meter out of order					
OCT.	0.41 *	0.28 *	0.23 *	7.2 *	0.27 *	0.20 *
NOV.	0.89	0.29	0.12	3.6	0.16	0.10
DEC.	0.86	0.30	0.13	4.0	0.14	0.11
YEARLY AVERAGE	1.07	0.46	0.31	9.4	0.34	0.31

TOTAL FLOW FOR YEAR - 111.5

\* Estimated due to incomplete records

Yearly operating cost =  $\frac{12014.79}{111.5}$  = \$ 108 per MG  
= 10.8 ¢ per 1000 gallons.

# SAMPLE RESULTS

1961

MONTH	AVERAGE INFLUENT	B.O.D. EFFLUENT	% REDUCTION	AVERAGE INFLUENT	S. S. EFFLUENT	% REDUCTION
JAN .	165	30	82	346	8	98
	310	31	90	370	60	84
	265	58	78	345	98	72
FEB .	185	11	94	296	36	88
	185	23	87	324	48	85
	155	20	87	480	70	86
MAR .	160	58	64	178	50	72
	215	19	96	240	52	78
	145	20	86	368	60	84
APR .	120	12	90	192	58	70
	80	9	88	246	34	86
	270	8	97	526	34	94
	115	9	92	194	42	78
MAY	70	12	83	228	36	84
	85	10	88	156	32	80
	135	16	88	176	26	85
	130	5.2	97	224	18	92
	150	6.4	96	242	44	82

MONTH	AVERAGE INFLUENT	B.O.D. EFFLUENT	% REDUCTION	AVERAGE INFLUENT	S. S. EFFLUENT	% REDUCTION
JUNE	150	4	97	212	64	70
	90	8	89	172	4	97
	225	12	86	632	32	95
	180	23	87	254	40	84
JULY	95	24	71	130	16	88
	160	23	85	276	12	96
	105	19	82	146	88	40
AUG.	130	12	98	204	48	94
SEPT.	245	68	72	386	22	89
	175	21	88	258	24	91
OCT.	215	12	94	356	12	97
NOV.	530	10	98	712	36	95
	240	6.8	97	276	26	91
DEC.	215	4.4	98	234	6	98
	130	3.6	97	156	9	94
YEARLY AVERAGE	176	18	88	289	38	85

GRIT REMOVAL

MONTH	CUBIC FEET	CUBIC FEET/M.G.
JANUARY	4	0.5
FEBRUARY	15	2.2
MARCH	11	1.1
APRIL	13	0.8
MAY	15	0.8
JUNE	8	0.7
JULY	12	1.2
AUGUST	11	1.4
SEPTEMBER	10	---
OCTOBER	7	1.0
NOVEMBER	9	2.5
DECEMBER	7	1.7
TOTAL	122	13.9
AVERAGE	10	1.3



POWER COSTS

MONTH	TOTAL CONSUMPTION	1st RATE	2nd RATE	3rd RATE	SERVICE CHARGE	TOTAL BILL	
						GROSS	NET
JAN .	10500	1530	1530	7440	41.31	120.94	108.85
FEB.	9000	1467	1467	6066	39.60	112.43	101.19
MAR.	9000	1307	1307	6386	35.29	103.41	93.07
APRIL	7500	1307	1307	4886	35.29	98.46	88.61
MAY	7500	1212	1212	5076	32.71	93.09	83.78
JUNE	7500	1275	1275	4950	34.43	96.66	86.99
JULY	6000	1199	1199	3602	32.36	87.42	78.68
AUG.	6000	1199	1199	3602	32.36	87.42	78.68
SEPT.	7500	1275	1275	4950	34.43	96.66	86.99
OCT.	6000	1148	1148	3704	30.98	84.53	76.08
NOV.	6000	1148	1148	3704	30.98	84.53	76.08
DEC.	7500	1148	1148	5204	30.98	89.48	80.53
TOTAL	90000	15215	15215	59570	410.72	1155.03	1039.53
AVERAGE	7500	1270	1270	4970	34.20	96.20	86.50

$$\text{Power Costs per million gallons} = \frac{1039.53}{111.5} = \$ 9.32$$

SEWAGE SLUDGE GAS PRODUCTION

FUEL OIL CONSUMPTION

MONTH	GAS PRODUCED CU. FT.	GAS TO WASTE CU. FT.	GAS CONSUMED CU. FT.	OIL CONSUMED GALLONS	B.T.U.'s CONSUMED
JANUARY	68223	0	68223	730	143,000,000
FEBRUARY	267922	31527	236395	370	193,900,000
MARCH	143599	0	143599	403	142,500,000
APRIL	121259	0	121259	285	112,700,000
MAY	75606	1771	73835	155	66,000,000
JUNE	32186	3491	28695	47	23,800,000
JULY	90109	2950	87159	0	52,300,000
AUGUST	89397	20619	68778	0	41,300,000
SEPTEMBER	74286	12484	61802	0	37,100,000
OCTOBER	86808*	0*	86808*	0*	52,000,000
NOVEMBER	79079	0	79079	290	88,100,000
DECEMBER	112740	0	106670	305	106,700,000
TOTAL	1141214	72832	1062302	2585	1,059,400,000
AVERAGE	95101	6069	88 525	215	88,283,333

Assumption:

B.T.U.'s of sewage gas = 600 per cu. ft.

B.T.U.'s of fuel oil = 140,000 per gallon.

SLUDGE REMOVAL

MONTH	GALLONS	GALLONS PER M. G. FLOW	SLUDGE TO BEDS
JANUARY	74400	8550	
FEBRUARY	52800	7900	
MARCH	74400	7510	
APRIL	72000	4600	
MAY	22500	1185	
JUNE	44400	3960	
JULY	55200	5350	4
AUGUST	35100	4560	8
SEPTEMBER	40500	----	4
OCTOBER	32400	4500	
NOVEMBER	20500	5250	
DECEMBER	20500	5100	
TOTAL	544700	58265	120,000 gallons

WATER COSTS 1961

PERIOD	TOTAL CONSUMPTION	1ST RATE	2ND RATE	3RD RATE	SERVICE CHARGE	CURRENT BILL	
						GROSS	NET
JAN. 1 - MARCH 31	387,000	200,000	87,000			88.70	79.83
APRIL 1- JUNE 30	59,000	59,000				23.60	21.24
JULY 1 - SEPT. 30	59,000	59,000				23.60	21.24
OCT. 1 - DEC. 31	68,000	68,000				27.20	24.48
TOTAL	473,000	386,000	87,000			163.10	146.79

FERGUS  
ANNUAL BUDGET  
1962

STAFF PAYROLL

R. Bridge	\$3750	3750
	Increase retroactive to Jan. 1 \$150	150
A. Carlaw	\$3480	<u>3480</u>
		7380
	Superannuation @ 6%	<u>450</u>
	Total	7830

Fuel Oil

Heating at plant - estimate 3000 gallons.		
	16.2 ¢ per gallon.	490

POWER

Estimate \$120 per month x 12 months		\$1440
--------------------------------------	--	--------

CHEMICAL

Effluent chlorination		
Estimate 10 lbs. per day for 170 days per year		
Total of 1700 lbs. @ \$14.00 per 100		
Cost =		238
Polycide, chloride of lime		<u>\$100</u>
	Total	\$338

GENERAL SUPPLIES

Brooms, soap, stationary, lubricants, lab chemicals		
\$50.00 per month x 12 months		\$600

EQUIPMENT

Minor new equipment, packing glands, tools etc.		
\$15.00 per month x 12 month = \$180		\$180

REPAIRS & MAINTENANCE

Repairs & maintenance on existing equipment		
\$400 for barminutor + \$10.00 per month x 12 months		\$520

SUNDRY

Telephone, shipping charges, laundry service, postage, etc.		
\$20.00 per month x 12 months		\$240

## INSURANCE

Paid up to 1963 but should lay away 1/3 per year

Boiler = \$60.00 per year

Plant = \$200.00 per year

\$260

## LANDSCAPING

A small sum should be set aside for improving  
the plant grounds, a bulldozer rental

\$300

## WATER

Estimate \$100.00 per year

\$100

## TAXES

Estimate only \$300.00 per year

\$300

Total yearly budget:

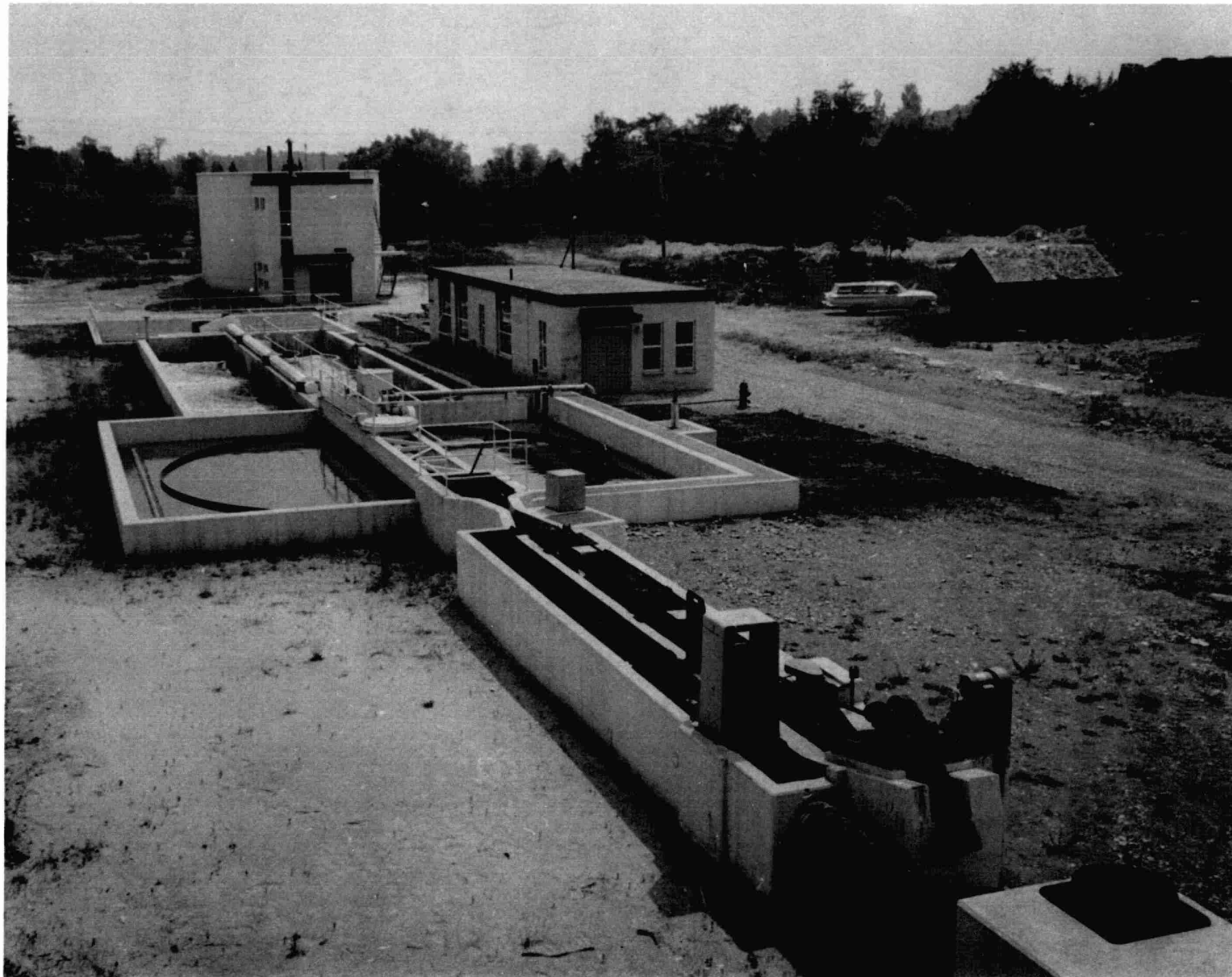
\$12598

ONTARIO WATER RESOURCES COMMISSION

PROJECT OPERATION STATEMENT

1961

MONTH	EXPENDI- TURE	PAYROLL	CASUAL PAYROLL	FUEL	WATER & POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIR AND MAINTENANCE	LANDSCAPE	SUNDRY
JAN.	833.70	535.38		70.96	106.85 18.36		26.20			66.25	9.70
FEB.	1096.29	618.33		201.53	108.85	10.67	108.06				48.85
MAR.	764.73	589.50			101.19		60.19				13.85
APR.	1546.72	589.50		103.26	172.90		29.76				606.48 Ins. 44.72
MAY	761.08	589.50			88.61		54.86		17.91		10.20
JUNE	824.30	589.50		42.01	83.78		34.81				74.20
JULY	850.08	589.50		83.92	108.23		54.43				14.00
AUG.	1119.33	884.25		10.73	78.68		54.37	61.25			30.05
SEPT.	752.93	589.50			78.68		68.75		7.70		8.30
OCT.	1283.87	589.50	142.50		108.23		36.59	86.75		128.75	170.00 Ins.
NOV.	997.92	589.50			76.08		253.14			57.00	22.20
DEC.	1183.84	884.25		132.56	76.08		68.24				22.71
TOTAL	12014.79	7638.21	142.50	645.07	1206.52	10.67	972.65	147.77	25.61	252.00	1097.14





[illegible]

Environment Ontario  
Laboratory Library  
125 Resources Rd.  
Etobicoke, Ontario M9P 3V6  
Canada